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CORPORATE GOODWILL: A Game Theoretic Approach to the Effect of Corporate Charitable Expenditures on Firm Behaviour*

by

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ABSTRACT**: *Corporate contributions to charity, like advertising expenditures, may have a long-term effect on a firm's image and profits. Recent examples of corporate giving show that many gifts are made in the 'enlightened self-interest' of the donor. One way to view corporate giving is as a managerial tool that affects the firm's profits. This paper examines charitable spending, where firms treat 'goodwill' expenditures in both the product and factor markets as strategic variables. Contributions may be enhanced or impaired by contributions made by other firms. The model allows firms to make decisions about corporate giving that are cooperative or noncooperative, where efficiency is gained through cooperation. Market conditions determine whether cooperation is sustainable. As the time horizon lengthens, the discount factor of future earnings rises, or the level of industry cooperation rises, and firms are more likely to cooperate in charitable giving.*

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** Résumé en fin d'article; Zusammenfassung am Ende des Artikels; resúmen al fin del artículo.

1 Introduction

Strictly speaking, the term 'corporate contributions' refers to corporate gifts of cash or property to charities; these contributions annually amounted to nearly $6 billion in the early 1990s (Foundation Directory 1993[1]). In practice many expenditures, including corporate contributions and some business and advertising expenditures, are part of a broader class of expenditures aimed at selling and promoting company goods and services.[2] Charitable expenditures may serve to raise public awareness about the 'social consciousness' of a corporation and are nearly always in the firm's 'enlightened self-interest';[3] that is, they have a long-term effect on a firm's 'goodwill' or image.[4]

The Corporate Philanthropy Report (1990, Vol. 1, No. 6, pp. 7,16) and Craig Smith (editor, in letter dated 5 September 1990) offer several examples that indicate the nature of corporate contributions in the 1980s:

(i) IBM has begun touting its social responsibility policies in an advertising campaign. In one advertisement, people at IBM discuss the company's 'values that last . . . respect for one another, for our customers, and for every individual touched by what we do'. Some focus on small businesses, the environment, and community relations.

(ii) Nissan's Infiniti Division and Toyota's Lexus Division are both using cultural sponsorships to position themselves with affluent

1 US Code of Federal Regulations (26 CFR), 1988. Internal Revenue Code, classification 501(c)(3). For more on the tax laws regarding corporate giving, see Webb (1994).

2 We use the term 'corporate goodwill' to refer to all donations made to charitable organizations and other worthy causes that also enhance the reputation of the corporate donor. It does not refer to the asset classification used by a firm's accounting system. In practice, these donations are very difficult to measure as they may be called charitable donations, advertising expenditures, or other forms of business expenditures according to the accounting records of the corporation. Note that all forms of business expenditures and contributions are treated the same according to the tax code. For more on this, see Smith (no date).

3 Enlightened self-interest may be said to encompass any activity that benefits the firm in the long run, whether the activity maximizes profits, or some other objective function. One of the first discussions of this concept is found in Baumol (1970). For another source, see Galaskiewicz (1985). For more foundation giving in general, see Odendahl (1987).

4 This is not to say that the intent of corporate executives in sponsoring worthy causes is strictly to promote the firm's interests.

Americans. Lexus sponsored *Phantom of the Opera* in Los Angeles, Goodwill Games in Seattle, Miami City Ballet, San Francisco Opera, and the Philadelphia Orchestra. Infiniti favours the Chicago Symphony, Kansas City's Starlight Theatre, jazz and blues artists in Chicago, and the Dallas Arboretum's new international garden.

(iii) Japanese companies are increasingly supporting US charities. The Center for Better Corporate Citizenship (CBCC), which received its tax-exempt status in June 1990, allows Japanese companies that do not have their own foundations to fund US nonprofit organizations by using the CBCC to arrange tax-exempt status for gifts. CBCC was created 'to heighten the awareness of the Japanese investing firms to the concerns of the local communities and nations, and to encourage and support Japanese integration into the local societies'.

These examples demonstrate that firm image and charity are tied together in such a way that corporations benefit not only by being socially responsible, but also receive benefits from increased sales, more satisfied employees, and positive reactions from the community.

The concepts of corporate giving and corporate goodwill have been linked for many years. In 1935, Franklin Roosevelt surmised that corporations use corporate gifts to 'purchase' goodwill (Corporation Gifts to Charities, 1935, p.540). However, corporate goodwill has been largely ignored by economists. Only Maddox McElroy and Siegfried (1981) model the effects of corporate expenditures on a profit-maximizing firm's demand and costs. They state that price is based on contributions inducing good-will, an intangible intermediate product that influences demand' (p. 212). Maddox McElroy and Siegfried also note that some firms' costs may be lowered by contributions, but they never specifically mention goodwill when describing costs. Other studies model corporate giving by assuming one of four motivations: profit maximization, utility maximization of managers or owners, altruism, and social responsibility or duty. For more on these motivations and empirical studies testing these hypotheses, see, for example, Navarro (1988a, 1988b), Clotfelter (1985), and Maddox and Siegfried (1981) and Maddox McElroy and Siegfried (1981, 1982).

The advertising literature examines firms' image or goodwill and the effect of advertising expenditures on other firms (Friedman 1983). This paper combines ideas from the economics literature on corporate giving with the advertising concepts addressing the actions a firm takes to affect its image or the image of another firm. We present a new model of corporate giving where firm image and the effect of each firm's

contributions on the other are considered. The model is similar to Friedman's advertising model, in that firms treat goodwill expenditures made to enhance sales as a strategic variable. In addition, firms recognize that their expenditures may help other firms or harm them. The model differs in that firms recognize that corporate contributions may affect the reputation of the firm in the factor market.[5]

The purpose of this paper is to examine the effects of cooperation in charitable spending in the context of a theoretical model, where firms either explicitly or implicitly agree to a joint profit-maximizing level of contributions but remain competitors in the product market.[6] This analysis is conducted in terms of a static model of oligopolistic competition. In the base case, firms compete in levels of corporate charitable spending and output. The conditions for cooperation in charitable spending are analysed, and incentives to deviate are explored. The equilibrium and comparative static results provide insight into the nature of corporate charitable activities. Although data sources needed to test our hypotheses are scarce, we hope that we can provide insight into charitable giving that will be useful to test corporate behaviour in the future. As Weisbrod notes, 'until we decide what kinds of questions we seek to answer we cannot define the nonprofit sector in a useful manner, and we cannot specify what data about it would be of interest' (1977, p.11).

2 The effect of corporate contributions

Corporate contributions may affect the firm's image, which in turn affects corporate profits. Contributions may improve the image of the firm in the eyes of potential and current customers, as well as

5 We assume that firms are concerned with social responsibility. Books such as *Green at Work* (Cohn, 1992), *The Human Side of Corporate Competitiveness* and *The Role of Business in Society* (Diebold 1982) suggest employees, stockholders and other parties interested in supplying labour and capital to a business are concerned with firms' 'social responsibility'.

6 It is probably unusual for firms to make explicit contracts with one another to provide charitable gifts or services to a particular charity. However, in some industries and in some regions of the USA, firms participate in 'giving clubs' or 'tithing clubs', where they agree to donate a given percentage of income to charity. This practice suggests that firms must make donations in order to be viewed as socially responsible.

employees of the firm, and make them more likely to buy the firm's products or want to work for the company. Similarly, contributions may increase the likelihood that creditors and other interested parties make decisions that are in the interest of the corporation's business operations. Contributions, then, can raise demand for the firm's goods and services, and lower costs, and are modelled as inputs to both the inverse demand and cost functions.[7]

Corporate contributions have effects on other firms both inside and outside the industry. These inter-firm effects may be characterized as 'cooperative' or 'predatory'. As Tirole notes (1988, p.372), predation is an intuitive notion referring to using low prices or high advertising levels to induce a rival's exit, even though this may simply be a competitive ('innocent') behaviour intended to maximize profits. It is quite likely that corporate contributions are made in the firm's self-interest and, in many cases, in a competitive manner. Like advertising, these gifts may have detrimental effects on other firms; however, it is difficult to imagine that a corporate executive could strategically use corporate giving with the intent to run another firm out of business. We will refer to contributions that help an industry or group of firms as 'helpful' or 'cooperative', and those that are 'predatory' as 'harmful', meaning harmful to other firms.

In the output market, harmful contributions are characterized by an expenditure that benefits the firm making the donation by shifting sales to it, away from its rivals, without causing new firms to enter the market. An example is Apple Computer's donations of millions of its computers to the elementary education system. These donations converted millions of school-age children, as well as their parents and teachers, into loyal consumers of Apple products. On the other hand, contributions made by a dairy, and supported by the logo of the American Dairy Council, benefit both the dairy and all dairy producers. This type of contribution may be thought of as cooperative,

7 It is unlikely that corporate contributions immediately result in awareness of the good deeds of the company. More likely, these expenditures create a kind of intangible capital, which might be called goodwill. Over time, the stock of goodwill would diminish to zero if no further expenditures were made to charitable organizations. We have chosen to focus on the inter-firm effects of contributions rather than to model the intertemporal aspects of corporate goodwill. We note, however, that if contributions are represented by c, and the stock of goodwill, S, depreciates at the rate of d, then goodwill depreciates over time according to some function $S=c+ds[t-1]+\ldots$. For more on goodwill and depreciation, see Webb (1992).

or helpful, in the output market.[8] Of course, some examples are not clearly harmful or helpful. Mobil Oil's support of public television, while benefiting Mobil, may benefit the reputation of all firms in the oil industry to some degree, or may have no effect on other firms.

Both harmful and helpful gifts may be made to affect the factor market. A harmful gift is made to lower the firm's input costs relative to the costs faced by rival firms. When a company donates a large amount to a business school, it expects to lure graduates away from its competitors in the labour market by having a 'presence' on the campus. In contrast, a helpful gift lowers the cost of attracting labour to the industry or to the local area, at the expense of some other industry's or local area's cost of hiring labour. If pharmaceutical companies contribute to chemical engineering departments of universities and colleges, the pharmaceutical industry may lure graduates away from the oil industry, the major competitor for this type of labour.

3 The model

A static game theory duopoly model with two symmetric firms is used to illustrate the problem of profit maximization where the choice variables are goodwill (charitable) expenditures and output. The model may be generalized to include n firms. In the model, quantity and demand are assumed to be linearly related; because of the likelihood of diminishing returns in goodwill spending, linearity is not imposed on goodwill.

The firm's inverse demand function is a function of quantity and the effects of both firms' goodwill spending. A negative relationship between price and quantity holds, and a positive relationship between the firm's own goodwill spending and price is assumed. In addition, w_D is used to measure the effect of the other firm's contributions on price. This effect may be positive (helpful) or negative (harmful): a firm's contribution which increases its own demand may also increase demand for both firms' production, or it may decrease demand for the other firm's products.

8 This could be viewed as a positive externality as well as a cooperative action. Since the use of the term 'cooperative' may be the situation where players negotiate before the game, cooperative applies to charitable giving in the sense that many corporate giving officers consult one another and plan gifts as a result of information about other firms' contributions.

Goodwill enters the cost function via the effect of expenditures made that lower the cost of factor inputs. Costs are a function of the firm's own production and goodwill spending chosen in each period. The effect of the other firm's contributions on costs is captured by w_C.

The total spending on charitable contributions by firm 1 is:[9]

$$G_i = G_{iC} + G_{iD} \tag{1}$$

where G_{iD} are contributions that raise demand and G_{iC} lower costs.

Firm 1 's inverse demand and average cost functions are[10] (where j refers to the other firm):

$$P_i = u - q_i - q_j + G_{iD}^{1/2} + W_D G_{jD}^{1/2} \tag{2}$$

$$C_i = v + q_i - G_{iC}^{1/2} - w_C G_{jC}^{1/2} \tag{3}$$

Where P_i =the price firm 1 may charge

u,v =the demand and cost intercepts

q_i =the quantity produced by firm 1

w_D =the effect of goodwill expenditures made by firm 2 that affect the price firm 1 receives (this could be positive if firm 2's expenditures are helpful, or negative if they are not)

w_C =the effect of goodwill expenditures made by firm 2 that affect the costs of firm 1 (similarly, positive or negative).

Note that $-1 \leqslant w_C, w_D \leqslant 1$, that is, the effects of goodwill expenditures may range from completely harmful (or predatory) (-1) to completely helpful (or cooperative) $(+1)$. Thus, $w_D G_{2D}^{1/2}$ represents the total effect on firm 1 (positive or negative) of firm 2 's contributions affecting the output market.

Combining, the profit function for firm 1 is:

$$\pi_1 = P_1 q_1 - C_1 q_1 - G_1 \tag{4}$$

The profit function may be analysed under three usual game-theoretic cases (mathematical derivations are available from the authors). In the first case, firms are noncooperative and compete in

9 In practice, separating contributions that raise demand from those that lower costs would be extremely difficult. Many contributions probably affect both demand and cost, at least to some degree.

10 Our general results are robust to this specification, except in case 3, which is discussed.

both output and goodwill.[11] Each firm must take into account its rival's behaviour; thus each firm forecasts the other firm's output and goodwill choices in order to make sensible decisions about its own choices. Each firm chooses its profit-maximizing level of output and goodwill expenditures in both the factor and output markets:

$$\pi_i^*(ncoop) = \frac{(u-v)^2(6)}{(8-w_D-w_C)^2} \tag{5}$$

First-order conditions and comparative statics show standard results: if firm 2 makes a cooperative contribution (one which increases industry demand or lowers industry costs, i.e. $w>0$), the quantity firm 1 sells rises, and the price firm 1 may charge rises, increasing profits for firm 1. By symmetry, the same holds true for firm 2. Additionally, if firm 1's expenditures are competitive with firm 2's, the price and quantity responses are negative, and lower profits result for both firms.

Second, consider the situation where firms (implicitly or explicitly) agree to cooperate in their expenditures on goodwill, but still compete with respect to their output level. Firms choose goodwill expenditures to maximize joint profits given and q_1 and q_2. To find the equilibrium, assume that firm 1 maximizes profits given the goodwill choices of both firms, and sets q_1 accordingly. Firm 2 maximizes profits similarly. The equation:

$$Max_{G_{iD},G_{iC}}[\pi_1(G_{iD}, G_{iC};\ q_1,\ q_2) + \pi_2(G_{iD},\ G_{iC};\ q_1, q_2)] \tag{6}$$

results in the optimal choices of goodwill in the factor and output markets for each firm. Solving for the cooperative solution results in:

$$\pi_i^*(coop) = \frac{1}{12}[(u-v) + G_{1D}^{1/2}(1+W_D) + G_{1C}^{1/2}(1+W_D)]^2 - G_{1C} - G_{1D} \tag{7}$$

Comparison of equations (5) and (7) show that $\pi_i^*(coop) > \pi_i^*(ncoop)$. The comparative static results are the same as in the noncooperative solution. If the firms' expenditures are cooperative, goodwill raises quantity and price, increasing profits for both firms. If they are not, the quantity sold and price that either firm may charge is lower, decreasing profits.

11 Noncooperative refers to the structure of the industry—a firm may choose to compete in goodwill if it is to its advantage to do so.

Because cooperation in goodwill spending has a positive effect on both firms' profits, cooperation leads to higher levels of goodwill spending and higher profits than in the noncooperative case. Similarly, making charitable expenditures that have negative effects on both firms' profits leads to lower levels of goodwill spending than in the noncooperative case. This is as expected, and efficiency is gained through cooperation.[12]

Suppose firms are cooperating in charitable spending. A natural question to ask is, why should a firm continue to cooperate? Alternatively one could ask, will cooperation last? Although it is unlikely that firms make explicit agreements to cooperate with each other in charitable spending, they may tacitly agree to a cooperative strategy that results in an equilibrium level of cooperative contributions. On the other hand, if contributions are used to differentiate the firm from its competitors, the 'cooperative strategy' results in an equilibrium level of 'harmful' contributions. The third case considers the conditions that might cause a firm to deviate from the cooperative strategy.

Suppose that firm 1 deviates from the cooperative equilibrium by lowering its goodwill spending. It adversely affects profits in the industry, but it may still enjoy higher profits by receiving the benefit of firm 2's contributions. Firm 1 maximizes profits according to equation (4) and chooses q_1, G_{1D}, G_{1C}, treating values for q_2, G_{2D}, G_{2C} as in the cooperative solution. It can be shown that:

$$\pi_1^*(dev) > \pi_1^*(coop) > \pi_1^*(ncoop) \tag{8}$$

The level of cooperation in goodwill spending, w, enters each of the profit equations. As w rises (falls), profits rise (fall) in each case, but the rate of change of profits is not obvious and depends on the functional form we have chosen. The level of w affects profits and the incentives for firms to cooperate in goodwill spending, but the exact conditions for sustaining cooperation are not known with certainty. In this functional form, as w goes up, cooperation is less likely.

12 Note output changes with the level of goodwill, and is different in the cooperative and noncooperative cases. The level of goodwill spending ultimately chosen may be different from the expected solution. In this example, a cooperative choice of goodwill spending expands demand for both firms. The result gives increased incentive to expand output, which may harm the firm's prices. The consequences of these changes on profits determine whether or not it is in each firm's interest to cooperate in goodwill spending. This scenario is not examined in this paper.

More interestingly, firms have different time horizons and discount rates which affect their strategic decisions. Because firms make choices simultaneously, each firm chooses its action before observing that of the other firm. Each has no possibility of reacting in the current period. Suppose that firms monitor each other's activities, and, employing a simple trigger strategy, are prepared to revert to a noncooperative strategy in the next period if deviation occurs.[13] Both firms' reaction functions are constructed from the noncooperative solution. As theory predicts, firm 1 would find it in its interest to lower charitable spending only if the loss resulting from returning to the noncooperative strategy in the future is lower than the one-period gain resulting from deviating in the current period.[14] Thus, firm 1 will continue to cooperate if:

$$[\pi_0(dev) + \sum_{t=1}^{T} \beta^t \pi(ncoop)] < \sum_{t=0}^{T} \beta^t \pi(coop) \tag{9}$$

where β is the discount factor ($\beta = 1/(l + r)$, where r is the discount rate), and t represents time. This general result, not specific to this model, changes as β and T change. The left-hand side represents the profits from deviating in the current period plus profits earned in all subsequent periods under the noncooperative scenario. The right-hand side is long-run profits from cooperating. If β rises, the firm discounts future values less, and the profits from both the noncooperative and cooperative situations change. Because $\pi_i^*(coop) > \pi_i^*(ncoop)$, it is more likely that cooperation will be sustained since profits are likely to be higher under cooperation. Similarly, as T increases, the number of periods that firms revert to the noncooperative situation rises, changing the trade-off between profits from deviating and profits from cooperating. Again, profits are higher in the cooperative case, which makes cooperation more likely to be sustained.

13 For more on trigger strategies, see Friedman (1971) and Green and Porter (1984).

14 If firms are predatory in their charitable spending, raising goodwill spending increases the negative effects of goodwill on industry profits. In the current period, firm 1 might raise its goodwill spending and raise its own profits, but it can expect that firm 2 will follow suit in the next (and all succeeding) periods, lowering industry profits in the long run. Again, firm 1 would find it in its interest to deviate from the cooperative strategy only if the loss resulting from returning to the noncooperative strategy in the future is lower than the one-period gain resulting from deviating in the current period.

4 Findings and ideas for future research

This paper establishes a framework for examining charitable spending using a static duopoly model, where firms treat goodwill expenditures in both the output and factor markets as strategic variables. Goodwill expenditures are harmful or helpful (cooperative), and efficiency is gained through cooperation (profits from cooperating are larger than profits from noncooperation).

The model suggests specific outcomes which might be observed empirically. Two major questions are: (i) which firms give cooperatively and which give predatorily, and (ii) which firms have incentives to deviate from cooperative giving? First, we discuss what types of products, firms, and industries might be likely to engage in predatory or cooperative giving. Second, we discuss what conditions provide incentives to deviate from cooperative giving.

4.1 Predatory versus cooperative giving: products, firms, and industries

The model suggests that in industries that gain from cooperative contributions, firms are likely to contribute more than noncooperative firms, and are likely to have higher profits as a result. Similarly, firms in industries that compete with one another are likely to contribute less and to have lower profits. Thus, one might expect industries with highly substitutable products to be predatory. If the industry behaves as a zero-sum game, then it is important to gain market share at the expense of a competitor. Coke and Pepsi, various beer brands, and Ford versus General Motors are examples that might warrant examination.

An industry with great brand-name recognition might be expected to participate more in predatory giving. Because of name recognition it is easier to gain at the expense of your competitor (once again, Coke versus Pepsi). If there is no brand-name recognition (milk, for example) one would expect predatory giving to be ineffective; cooperative giving would more effectively boost the industry. Further, if an industry gains (as a whole) from giving, then cooperative giving is expected. For example, the cigarette industry might attempt to 'defend' itself as an industry; market share of a particular brand may not be as important as industry reputation and sales. Similarly, food products like chicken and beef compete with other entire industries as much as they do within the industry. In these cases, firms within the industry may work together to 'beat' the other industry.

4.2 Conditions for deviation (predatory giving)

What conditions provide firms with incentives to deviate from cooperative giving? The model contends market conditions determine whether cooperation is sustainable. As the time horizon lengthens or the discount factor of future earnings rises, firms are more likely to cooperate in charitable spending because the short-run rise in profits from deviating is outweighed by the long-run profits earned from cooperating.

Firms that deviate from agreements do so because the short-lived profit from doing so exceeds the long-term benefits from cooperation. Short time horizons or huge one-time profits from cheating on an (explicit or implicit) agreement would cause deviation to occur. The short time horizon may exist in firms with older managers, or firms that produce a 'faddish' product such as, perhaps, a diet drink or a child's game, or some types of clothing. Producers of products made with rapidly changing and quickly outdated technologies may also have short time horizons.

A longer time horizon might be found in corporations where products have existed longer. Thus, history could be a predictor of the future. 'Stable' corporations (blue chip stocks, for example), and those with patents (such as pharmaceuticals) should have a long-time horizon. Finally, firms with young managers (across industries) may have a longer time horizon. In all these cases, the model suggests a higher degree of cooperative giving relative to firms with shorter time horizons.

Lastly, firms that are tied to a community by large physical capital investments (such as a car plant) or by locational constraints (such as a utility or cable company) would be expected to engage in corporate giving in general. Owing to their long time horizon, we might expect to see a higher degree of cooperative giving.

4.3 Suggestions for empirical testing

Although little data exist to test these theoretical conclusions, firm-level data on corporate contributions are starting to become more available and reliable.[15] These data may lead to testable hypotheses about the use of corporate contributions as strategic variables in

15 Even though some data for total corporate giving, by firm, exist, their unreliablity make drawing conclusions about motivations and effects of corporate giving questionable.

firms' decision sets. Webb's (1992, pp.189–94) analysis of 831 large, publicly traded corporations reporting contributions (Compustat 1970–89) attempted to show a relationship between corporate foundations and long-term measures of firm profitability, tax rates, and size and industry characteristics. Firms with corporate foundations tend to observe each other's charitable activities. These firms tended to have higher profits than firms without foundations. Whether this can be construed as some sort of cooperation in corporate giving is unclear from current empirical work. However, continued analysis of the giving patterns of corporations may lead to evidence for or against our results.

Analysis of the relationship between a firm's giving and concentration ratios, advertising ratios, and other industrial attributes would improve understanding of the relationship between strategy, industry type and giving. Specifically, the model's prediction that predatory giving would rise with greater degrees of competition might be tested by examining market concentration, advertising spending, measures of importance of brand name, and substitutability (or other proxies for competition) against the amount and types of gifts made by firms in various industries. For example, how does giving by Coca-Cola and Pepsi Co. differ from giving by firms producing a good with little brand-name recognition or giving by firms whose products are not easily substitutable?

Similarly, how does giving change in an industry where cooperation might result in industry gains? (And, more importantly, how can these industries and gains be identified?) Would donations by the 'Got Milk' campaign (formerly the California Dairy Association, now being used across the USA) have a different effect on the dairy industry than, say, donations by cigarette manufacturers on the tobacco industry? Identifying industries that give cooperatively is the first step in testing the model's hypothesis about cooperative giving; the second is identifying gains from corporate giving in conjunction with advertising efforts.

Analysis of the nature of gifts might provide insight into the effect of corporate goodwill on both the factor and output markets. One of the ways to examine goodwill in the factor market is to examine the reasons for and extent of corporate participation in employee-matching grants programmes. (Aetna, for example, has a very liberal programme, allowing employees to donate time and money to their choices of charities, which is matched with support from Aetna.) In addition, if corporations give largely to 'public' concerns (city parks and improvements, individual local arts grants, etc.) it may be that these

contributions are used to lower the firm's wage bill, entice workers to move to the area or remain in the same job because the employer is a 'good corporate citizen.'

Goodwill in the output market may be further explored by raising the following issues. When is contributing a substitute for advertising? How are sponsorships of sporting events different from advertising expenditures made for the same purposes? Does charitable sponsorship raise consumer awareness about certain products or companies? Are 'high-profile' contributions made by certain companies in certain situations; for example, did Exxon increase contributions after the oil spill? Do some contributions increase the firm's market share at the expense of some other company's share? An example that may support this idea is the 1991 US Sprint commercial on television, in which US Sprint offers new customers the chance to donate 5 per cent of their first telephone bill to the environmental charity of the customer's choice. Candice Bergen delivers the punchline in this advertisement: 'Are we doing this to get your business? Who cares, we're doing it!'

The idea that firms have different time horizons and discount rates which affect their strategic decisions may also be testable given new and better data. A different 'valuation' of time may be reflected in two ways. First, we might expect firms that intend to exist for many years to view corporate giving as an investment. The idea that Japanese firms contribute to US charities may suggest their intention to be in business for a long time. Firms producing a fad item or those whose products are becoming outdated may not be interested in philanthropy. Another time issue might be that the views of chief executives or other management figures on donations depend on their own discount rates and time horizons. These issues might be reflected in some of the data collected by the Foundation Center, or other agencies that send questionnaires to corporate givers.

Testable hypotheses are that firms with long product life-cycles, patents, younger management, and non-rapidly changing technologies should cooperate more in giving than do firms producing 'faddish' or technologically 'dated' products, or those with older management. Finally, firms with very large physical capital investments, or those constrained geographically (utilities, cable companies, and those depending on natural resources specific to a certain area) might participate to a greater extent in cooperative giving. Galaskiewicz (1991) provides an interesting analysis of corporate giving in the Minneapolis–St Paul area, where 5 per cent of net income is regularly expected of corporate donors.

In sum, with data on firm, products and industries, and specifically on substitutability among products, product life-cycle lengths, brand name recognition, competition (inter- or intra-industry), and manager ages, one could test whether predictions made by the model in this paper hold. The idea that corporate contributions have interfirm effects, and are strategic variables in a firm's decision-making process, suggest many avenues for future research into this little understood phenomena.

Appendix A

Case 1. A noncooperative duopoly

In a noncooperative situation, firms compete in both output and goodwill.[16] Each firm must take into account its rival's behaviour; thus each firm has to forecast the other firm's output and goodwill choices in order to make sensible decisions about its own choices. Each firm then chooses a profit-maximizing level of output and goodwill expenditures in both the factor and output markets:

$$\pi_i^*(ncoop) = \frac{(u-v)^2(6)}{(8-w_D-w_C)^2} \tag{10}$$

Solving the three first-order conditions and assuming symmetric firms gives: $q_1^* = q_2^*$, and $G_{1D}^* = G_{1C}^* = G_{2D}^* = G_{2C}^*$.[17] The comparative static results are:

$$\frac{\delta\pi}{\delta w_D}, \frac{\delta\pi}{\delta w_C} > 0 \quad \text{if } w_D, w_C > 0 \tag{11}$$

$$\frac{\delta\pi}{\delta w_D}, \frac{\delta\pi}{\delta w_C} < 0 \quad \text{if } w_D, w_C < 0 \tag{12}$$

16 Noncooperative refers to the structure of the industry—a firm may choose to compete in goodwill if it is to its advantage to do so.

17 Derivations and mathematical computations are available from the authors upon request.

Similarly,

$$\frac{\delta q}{\delta w_D}, \frac{\delta q}{\delta w_C} > 0 \quad \text{if } w_D, w_C > 0 \tag{13}$$

$$\frac{\delta q}{\delta w_D}, \frac{\delta q}{\delta w_C} < 0 \quad \text{if } w_D, w_C < 0 \tag{14}$$

From equations (11) and (13), if firm 2 makes a cooperative contribution (one which increases industry demand or lowers industry costs, i.e. $w > 0$), the quantity firm 1 sells rises, and the price firm 1 may charge rises, increasing profits for firm 1. By symmetry, the same holds true for firm 2. Equations (12) and (14) show if firm 1's expenditures are competitive with firm 2's, the price and quantity responses are negative and lower profits result for both firms.

Case 2. Cooperation in goodwill spending; competition in output

Consider the situation where firms (implicitly or explicitly) agree to cooperate in their expenditures on goodwill, but still compete with respect to their output level. The firms choose goodwill expenditures, G_{iD} and G_{iC}, to maximize joint profits given q_1 and q_2. To find the equilibrium, assume that firm 1 maximizes profits given the goodwill choices of both firms, and sets q_1 accordingly. Firm 2 maximizes profits similarly. The equation:

$$ax_{G_{iD},G_{iC}}[\pi_1(G_{iD},G_{iC};q_1,q_2) + \pi_2(G_{iD},G_{iC};q_1,q_2)] \tag{15}$$

results in the following:

$$G^*_{1C} = \left(\frac{q_1 + w_C q_2}{2}\right)^2 \qquad G^*_{1D} = \left(\frac{q_1 + w_D q_2}{2}\right)^2$$

$$G^*_{2C} = \left(\frac{q_2 + w_C q_1}{2}\right)^2 \qquad G^*_{2D} = \left(\frac{q_2 + w_D q_1}{2}\right)^2$$

Firm 1 chooses q to maximize profits, assuming that goodwill expenditures have already been chosen. This results in:

$$q_1 = \frac{1}{4}[u - v + G_{1D}^{1/2} + w_D G_{2D}^{1/2} + G_{1C}^{1/2} + w_c G_{2C}^{1/2} - q2] \tag{16}$$

Setting $q_1 = q_2$ and substituting in for goodwill results in the cooperative solution:

$$\pi_i^*(coop) = \frac{(u-v)^2(6 - 2w_D - w_D^2 - 2w_C - w_C^2)}{(8 - 2w_D - w_D^2 - 2w_C - w_C^2)^2} \tag{17}$$

Comparison of equations (10) and (17) show that $\pi_i^*(coop) > \pi_i^*(ncoop)$. The comparative statics results are the same as in the noncooperative solution (equations (11)–(14)). If the firms' expenditures are cooperative, goodwill raises quantity and price, increasing profits for both firms. If they are not, the quantity sold and price that either firm may charge is lower, decreasing firm profits.

Because cooperation in goodwill spending has a positive effect on both firms' profits, cooperation leads to higher levels of goodwill spending and higher profits than in the noncooperative case. Similarly, making charitable expenditures that have negative effects on both firms' profits leads to lower levels of goodwill spending than in the noncooperative case. This is as expected, and efficiency is gained through cooperation.[18]

Case 3. Incentives to deviate

Suppose firms are cooperating in charitable spending. A natural question to ask is, why should a firm continue to cooperate? Alternatively one could ask, is cooperation sustainable? Although it is unlikely that firms make explicit agreements to cooperate with each other in charitable spending, they may tacitly agree to a cooperative strategy that results in an equilibrium level of cooperative contributions. On the other hand, if contributions are used to differentiate the firm from its competitors, the 'cooperative strategy' results in an equilibrium level of 'harmful' contributions. This section considers the conditions that might cause a firm to deviate from the cooperative strategy.

Suppose that firm 1 deviates from the cooperative equilibrium by lowering its goodwill spending. It adversely affects profits in the industry, but it may still enjoy higher profits by receiving the benefit of

18 Note output changes with the level of goodwill, and is different in the cooperative and noncooperative cases. The level of goodwill spending ultimately chosen may be different from the expected solution. In this example, a cooperative choice of goodwill spending expands demand for both firms. This result gives increased incentive to expand output, which may harm the firms' prices. The consequences of these changes on profits determine whether or not it is in each firm's interest to cooperate in goodwill spending. This scenario is not examined in this paper.

firm 2's contributions. Firm 1 maximizes profits according to equation (4) and chooses q_1, G_{1D}, G_{1C}, treating values for q_2, G_{2D}, G_{2C} as in the cooperative solution. The profit function for firm 1, is:

$$\pi_1^*(dev) = \frac{(u-v)^2(18 - 6w_D - 6w_C + w_D^2/2 + w_C^2/2 + 2w_Dw_C)}{3(8 - 2w_D - w_D^2 - 2w_C - w_C^2)^2} \quad (18)$$

It can be shown that:

$$\pi_1^*(dev) > \pi_1^*(coop) > \pi_1^*(ncoop) \quad (19)$$

The level of cooperation in goodwill spending, w, enters each of the profit equations. When w is equal to zero, all profits are equal; there are no interfirm effects of contributions on profits. As w rises (falls), profits rise (fall) in each case, but the rate of change of profits is not obvious and depends on the functional form we have chosen. The level of w affects profits and the incentives for firms to cooperate in goodwill spending, but the exact conditions for sustaining cooperation are not known with certainty. In this functional form, as w goes up, cooperation is less likely.

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Bienfaisance d'entreprise: Une approche basée sur la théorie des jeux pour analyser l'effet des dépenses caritatives des entreprises sur leur comportement

Les contributions caritatives des entreprises, à l'instar des dépenses publicitaires, peuvent avoir une incidence à long terme sur l'image de l'entreprise et son profit. Des exemples récents de dons d'entreprise

témoignent que nombre d'entre eux sont faits dans le cadre de l'intérêt bien pensé du donateur. Une façon de considerer le don d'entreprise est de le traiter comme un instrument de gestion qui a un effet sur les profits de l'entreprise. Cet article examine les dépenses caritatives en considérant que les entreprises traitent ces dernières comme des variables stratégiques tant sur le marché des produits que sur celui des facteurs. Ces contributions de bienfaisance peuvent être accrues ou diminuées par celles des autres entreprises. Le modèle permet aussi aux entreprises de prendre en matière de dons des décisions de nature coopérative ou non coopérative, la coopération engendrant un gain d'efficacité. Les conditions du marché déterminent si la coopération est durable. Plus l'horizon temporel est éloigné, plus le taux d'actualisation des gains futurs est élevé ou plus le niveau de coopération industrielle dans le secteur est important, plus les entreprises sont susceptibles de coopérer en matière de donations caritatives.

Corporate Goodwill: ein spieltheoretischer Ansatz für die Wirkung wohltätiger Unternehmensausgaben auf das Unternehmensverhalten

Unternehmensbeiträge für wohltätige Zwecke können, wie Werbeausgaben, eine langfristige Wirkung auf das Image und die Gewinne eines Unternehmens haben. Neuere Beispiele von Unternehmensspendentätigkeit zeigen, daß viele Geschenke aus "wohlverstandenem Eigeninteresse" des Gebers gemacht werden. Eine Möglichkeit, Unternehmensspendentätigkeit zu betrachten, besteht darin, sie als ein Management-Instrument anzusehen, das die Unternehmensgewinne beeinflußt. Dieser Beitrag untersucht die Spendentätigkeit für wohltätige Zwecke unter der Annahme, daß Unternehmen "goodwill"-Ausgaben sowohl auf den Produkt- als auch auf den Faktormärkten als strategische Variablen behandeln. Spendenzahlungen können durch Spendenzahlungen, die andere Unternehmen leisten, erhöht oder gesenkt werden. Das Modell erlaubt den Unternehmen, Entscheidungen über die Unternehmensspendentätigkeit zu treffen, die kooperativ sind oder unkooperativ, Effizienz durch Kooperation erzielt wird. Die Marktbedingungen bestimmen, ob Kooperation aufrechterhaltbar ist. Mit der Verlängerung des Zeithorizonts steigt der Diskontierungsfaktor zukünftiger Gewinne, oder das Niveau der Kooperation in der Wirtschaft steigt, und es wird wahrscheinlicher, daß Unternehmen bei der Spendentätigkeit zugunsten wohltätiger Zwecke kooperieren.

Beneficencia de empresa: Una aproximación basada en la teoría de juegos para analizar el efecto de los gastos caritativos de las empresas sobre su comportamiento

Las contribuciones caritativas de las empresas a semejanza de los gastos publicitarios, pueden tener una incidencia a largo plazo sobre la imagen de la empresa y sobre su beneficio. Ejemplos recientes de donativos de empresas, atestiguan que muchos de ellos se efectúan en el marco del interés propio del donante. Una manera de considerar el donativo de empresa es tratorio como un instrumento de gestión que tiene efectos sobre los beneficios de la empresa. Este artículo examina los gastos caritativos bajo la consideración de que las empresas los tratan como variables estratégicas tanto en el mercado de productos como en el de factores. Estas contribuciones de beneficiencia pueden ser incrementadas o disminuidas por las de otras empresas. El modelo también permite a las empresas tomar en materia de donativos decisiones de naturaleza cooperativa o no cooperativa. La cooperación comporta un plus de eficacia. Las condiciones del mercado determinan si la cooperación es o no duradera. Cuanto más alejado esté el horizonte temporal, cuanto más elevada sea la tasa de actualización de los beneficios futuros o mayor sea el nivel de cooperación industrial en el sector, las empresas serán más proclives a cooperar en materia de donativos caritativos.